

**AMENDMENTS TO THE CLAIMS**

Please amend the claims as indicated hereafter.

**Claims:**

1. (Currently Amended) A mixture or set of sub-mixtures comprising X-mer precursors, wherein the X-mer precursors have a minimum length of 3 nucleotides; wherein the mixture has a minimum mixture coverage complexity of at least 56/N or wherein the set of sub-mixtures has a composite mixture coverage complexity of at least 56/N, wherein N represents the number of distinct X-mer precursors in the mixture; wherein each sub-mixture in said set has a reduced mixture coverage complexity as compared with the composite mixture coverage complexity; wherein each sub-mixture comprises a plurality of X-mer precursors; wherein said length is selected independently for each X-mer precursor; and wherein the mixture or set of sub-mixtures further comprises a set of tags that are distinguishable by mass spectrometry, wherein each tag is covalently linked to at least one X-mer precursor through a cleavable linker such that any given oligonucleotide sequence in the mixture is attached to preferably a single tag with a discrete molecular weight.
  
2. (Currently Amended) A mixture or set of sub-mixtures comprising X-mer precursors, wherein said X-mer precursors have a minimum length of 3 nucleotides; wherein said mixture has a minimum mixture coverage complexity of at least 56/N or wherein said set of sub-mixtures has a composite mixture coverage complexity of at least 56/N, wherein N represents the number of distinct X-mer precursors in the mixture; wherein each sub-mixture in said set has a reduced mixture coverage complexity as compared with the composite mixture coverage complexity; wherein each sub-mixture further comprises a plurality of X-mer precursors; wherein said length is selected independently for each X-mer precursor; wherein the mixture or set of sub-mixtures further comprises a set of tags wherein each tag is covalently linked to at least one X-mer precursor through a cleavable linker such that any given oligonucleotide sequence in the mixture is attached to preferably a single tag with a discrete molecular weight; and wherein said X-mer precursors have a determined isotopic composition.

3. (Original) The mixture or set of sub-mixtures of claim 1 or 2 wherein said mixture has a mixture coverage complexity of at least about 1/2 when said mixture contains at least 128 discrete X-mers, or wherein said set of sub-mixtures has a composite mixture coverage complexity of at least about 1/2 when said set of sub-mixtures contains at least 128 discrete X-mers.
4. (Original) The mixture or set of sub-mixtures of claim 1 or 2, wherein said mixture has a mixture coverage complexity of at least about 1/4 when said mixture contains at least 256 discrete X-mers, or wherein said set of sub-mixtures has a composite mixture coverage complexity of at least about 1/4 when said set of sub-mixtures contains at least 256 discrete X-mers.
5. (Original) The mixture or set of sub-mixtures of claim 1 or 2, wherein said mixture has a mixture coverage complexity of at least about 1/8 when said mixture contains at least 512 discrete X-mers, or wherein said set of sub-mixtures has a composite mixture coverage complexity of at least about 1/8 when said set of sub-mixtures contains at least 512 discrete X-mers.
6. (Original) The mixture or set of sub-mixtures of claim 1 or 2, wherein nucleotide sequences of the precursors of said mixture or set of sub-mixtures are known.
7. (Currently Amended) A mixture or set of sub-mixtures comprising X-mer precursors, wherein the X-mer precursors have a minimum length of 3 nucleotides; wherein the mixture has a minimum mixture coverage complexity of at least 56/N or wherein the set of sub-mixtures has a composite mixture coverage complexity of at least 56/N, wherein N represents the number of distinct X-mer precursors in the mixture; wherein each sub-mixture in said set has a reduced mixture coverage complexity as compared with the composite mixture coverage complexity; wherein each sub-mixture comprises a plurality of X-mer precursors; wherein said length is selected independently for each X-mer precursor; wherein the mixture or set of sub-mixtures further comprises a set of tags wherein each tag is covalently linked to at least one X-mer precursor through a cleavable linker such

that any given oligonucleotide sequence in the mixture is attached to preferably a single tag with a discrete molecular weight; and

wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is between approximately 10-100,000.

8. (Previously Amended) The mixture or set of sub-mixtures of claim 7 or 81, wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is between approximately 20-20,000.

9. (Previously Amended) The mixture or set of sub-mixtures of claim 7 or 81, wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is between approximately 20-10,000.

10. (Previously Amended) The mixture or set of sub-mixtures of claim 7 or 81, wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is between approximately 20-5,000.

11. (Previously Amended) The mixture or set of sub-mixtures of claim 7 or 81, wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is between approximately 50-1000.

12. (Currently Amended) A mixture or set of sub-mixtures comprising X-mer precursors, wherein the X-mer precursors have a minimum length of 3 nucleotides; wherein the mixture has a minimum mixture coverage complexity of at least  $56/N$  or wherein the set of sub-mixtures has a composite mixture coverage complexity of at least  $56/N$ , wherein N represents the number of distinct X-mer precursors in the mixture; wherein each sub-mixture in said set has a reduced mixture coverage complexity as compared with the composite mixture coverage complexity; wherein each sub-mixture comprises a plurality of X-mer precursors; wherein said length is selected independently for each X-mer precursor; wherein the mixture or set of sub-mixtures further comprises a set of tags wherein each tag is covalently linked to at least one X-mer precursor through a cleavable linker such

that any given oligonucleotide sequence in the mixture is attached to preferably a single tag with a discrete molecular weight; and

wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is greater than a mass number complexity (MNC) of a natural equivalent of the mixture or set of sub-mixtures, wherein the natural equivalent of the X-mer precursors are extended by one nucleotide, and wherein the number of tags in the set of tags is less than or equal to a number of X-mer precursors in the mixture or set of sub-mixtures.

13. (Previously Amended) The mixture or set of sub-mixtures of claim 12 or 82, wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is greater than 75% of a mass number complexity (MNC) of a natural equivalent of mixture or set of sub-mixtures, wherein the natural equivalent of the X-mer precursors are extended by one nucleotide, and wherein the number of tags in the set of tags is less than or equal to a number of X-mer precursors in the mixture or set of sub-mixtures.

14. (Currently Amended) A mixture or set of sub-mixtures comprising X-mer precursors, wherein the X-mer precursors have a minimum length of 3 nucleotides; wherein the mixture has a minimum mixture coverage complexity of at least  $56/N$  or wherein the set of sub-mixtures has a composite mixture coverage complexity of at least  $56/N$ , wherein N represents the number of distinct X-mer precursors in the mixture;

wherein each sub-mixture in said set has a reduced mixture coverage complexity as compared with the composite mixture coverage complexity;

wherein each sub-mixture comprises a plurality of X-mer precursors;

wherein said length is selected independently for each X-mer precursor;

wherein the mixture or set of sub-mixtures further comprises a set of tags wherein each tag is covalently linked to at least one X-mer precursor through a cleavable linker such that any given oligonucleotide sequence in the mixture is attached to preferably a single tag with a discrete molecular weight; and

wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is at least 0.5% of a number of X-mer precursors in the mixture or set of sub-mixtures, and less than or equal to the number of X-mer precursors in the mixture or set of sub-mixtures.

15. (Previously Amended) The mixture or set of sub-mixtures of claim 14 or 83, wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is at least 1% of a number of X-mer precursors in the mixture or set of sub-mixtures, and less than or equal to the number of X-mer precursors in the mixture or set of sub-mixtures.

16. (Previously Amended) The mixture or set of sub-mixtures of claim 14 or 83, wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is at least 10% of a number of X-mer precursors in the mixture or set of sub-mixtures, and less than or equal to the number of X-mer precursors in the mixture or set of sub-mixtures.

17. (Previously Amended) The mixture or set of sub-mixtures of claim 14 or 83, wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is at least 25% of a number of X-mer precursors in the mixture or set of sub-mixtures, and less than or equal to the number of X-mer precursors in the mixture or set of sub-mixtures.

18-73. (Cancelled)

74. (Original) A kit for carrying out a method of analyzing a target nucleic acid sequence, comprising:

- a. the mixture or the set of sub-mixtures of claim 1; and
- b. an enzyme having a nucleotide polymerase activity.

75. (Original) The kit of claim 74, further comprising a multiplicity of nucleotides selected from the group consisting of natural chain-terminating triphosphates and modified chain-terminating triphosphates.

76. (Original) The kit of claim 74, further comprising chain-terminating nucleotides with an affinity label for purification of nucleic acids.

77. (Original) A kit for carrying out a method of analyzing a target nucleic acid sequence comprising:

- a. the mixture or the set of sub-mixtures of claim 1; and
- b. a DNA ligase.

78. (Original) A kit for carrying a method of analyzing a target nucleic acid sequence, comprising:

- a. the mixture or the set of sub-mixtures of claim 1; and
- b. a condensing agent.

79. (Original) A kit for carrying out a method of analyzing a target nucleic acid sequence having a 3'-end and a 5'-end, comprising:

- a. the mixture or the set of sub-mixtures of claim 1;
- b. a DNA ligase; and
- c. an array comprising:
  - (a) a surface; and
  - (b) a multiplicity of nucleic acid sequence probes comprising:
    - (i) a nucleic acid attached to said surface, wherein the nucleic acid has a terminal 3'-hydroxyl end and wherein the 5' end is directly or indirectly attached to said surface.

80. (Original) A kit for carrying out a method of analyzing a target nucleic acid sequence having a 3'-end and a 5'-end, comprising:

- a. the mixture or the set of sub-mixtures of claim 1;
- b. a condensing agent; and
- c. an array comprising:
  - (a) a surface; and
  - (b) a multiplicity of nucleic acid sequence probes comprising:
    - (i) a nucleic acid attached to said surface, wherein the nucleic acid has a terminal 3'-hydroxyl end and wherein the 5' end is directly or indirectly attached to said surface.

81. (Currently Amended) A mixture or set of sub-mixtures comprising X-mer precursors, wherein the X-mer precursors have a minimum length of 3 nucleotides; wherein the mixture has a minimum mixture coverage complexity of at least 56/N or wherein the set of sub-mixtures has a composite mixture coverage complexity of at least 56/N, wherein N represents the number of distinct X-mer precursors in the mixture; wherein each sub-mixture in said set has a reduced mixture coverage complexity as compared with the composite mixture coverage complexity; wherein each sub-mixture comprises a plurality of X-mer precursors; wherein said length is selected independently for each X-mer precursor; wherein the mixture or set of sub-mixtures further comprises a set of tags wherein each tag is covalently linked to at least one X-mer precursor through a cleavable linker such that any given oligonucleotide sequence in the mixture is attached to preferably a single tag with a discrete molecular weight; wherein said X-mer precursors have a determined isotopic composition; and wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is between approximately 10-1,000,000.

82. (Currently Amended) A mixture or set of sub-mixtures comprising X-mer precursors, wherein the X-mer precursors have a minimum length of 3 nucleotides; wherein the mixture has a minimum mixture coverage complexity of at least 56/N or wherein the set of sub-mixtures has a composite mixture coverage complexity of at least 56/N, wherein N represents the number of distinct X-mer precursors in the mixture; wherein each sub-mixture in said set has a reduced mixture coverage complexity as compared with the composite mixture coverage complexity; wherein each sub-mixture comprises a plurality of X-mer precursors; wherein said length is selected independently for each X-mer precursor; wherein the mixture or set of sub-mixtures further comprises a set of tags wherein each tag is covalently linked to at least one X-mer precursor through a cleavable linker such that any given oligonucleotide sequence in the mixture is attached to preferably a single tag with a discrete molecular weight; wherein said X-mer precursors have a determined isotopic composition; and wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is greater than a mass number complexity (MNC) of a natural equivalent

of the mixture or set of sub-mixtures, wherein the natural equivalent of the X-mer precursors are extended by one nucleotide, and wherein the number of tags in the set of tags is less than or equal to a number of X-mer precursors in the mixture or set of sub-mixtures.

83. (Currently Amended) A mixture or set of sub-mixtures comprising X-mer precursors, wherein the X-mer precursors have a minimum length of 3 nucleotides; wherein the mixture has a minimum mixture coverage complexity of at least  $56/N$  or wherein the set of sub-mixtures has a composite mixture coverage complexity of at least  $56/N$ , wherein N represents the number of distinct X-mer precursors in the mixture; wherein each sub-mixture in said set has a reduced mixture coverage complexity as compared with the composite mixture coverage complexity; wherein each sub-mixture comprises a plurality of X-mer precursors; wherein said length is selected independently for each X-mer precursor; wherein the mixture or set of sub-mixtures further comprises a set of tags wherein each tag is covalently linked to at least one X-mer precursor through a cleavable linker such that any given oligonucleotide sequence in the mixture is attached to preferably a single tag with a discrete molecular weight; and wherein a number of tags in the set of tags distinguishable by mass spectrometry after cleavage of the linkers is at least 0.5% of a number of X-mer precursors in the mixture or set of sub-mixtures, and less than or equal to the number of X-mer precursors in the mixture or set of sub-mixtures.